CLAIMS

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A system for welding, comprising:

a welding-type power source, wherein

the welding-type power source has at least one control input, and

a welding-type output;

a feedback circuit,

responsive to the welding-type output, and

having a feedback output; and

a controller having

a feedback input connected to the feedback output, having

an eta control circuit responsive to the feedback input,

an eta output, and

at least one control loop having a selectable response time, a response time selector responsive to the eta output, and a control output connected to the control input.

2. The system of claim 1, wherein the control loop has at least two response times.

3. The system of claim 2, wherein the control loop has a plurality of response times chosen from a range of response times, wherein the response time is responsive to eta.

4. The system of claim 2, wherein the welding-type power source is an SCR based, phase controlled, power source.

5. The system of Claim 1, wherein the controller is a microprocessor controller.

6. The system of claim 2, wherein the feedback circuit includes a voltage feedback circuit.

7. The system of claim 6, wherein the response time selector includes an integrator responsive to an eta window.

8. The system of claim 6, wherein the at least one control loop includes a voltage control loop and a temporal control loop.

9. A method of providing welding power, comprising:

providing a welding-type output;

feeding back an output parameter;

determining an eta of the output;

controlling the welding-type output in response to feeding back; and

setting a response time of the controlling in response to eta.

10. The method of claim 9, wherein setting a response time includes selecting one of at least two response times.

11. The method of claim 10, wherein feeding back includes feeding back of an output voltage.

12. The method of claim 9, wherein setting the response time includes comparing eta to a window.

13. A system of providing welding power, comprising:

means for providing a welding-type output;

means for feeding back an output parameter, connected to the means for providing;

means for determining an eta of the output, connected to the means for feeding back;

means for controlling the welding-type output in response to the output parameter, connected to the means for providing and the means for feeding back; and

means for setting a response time of the means for controlling in response to eta, connected to the means for controlling and the means for determining.

14. The system of claim 13, wherein the means for feeding back includes means for feeding back an output voltage.

15. The system of claim 13, wherein the means for setting the response time includes means for comparing eta to a window, connected to the means for determining.

16. A system for welding, comprising:

a welding-type power source, having

at least one control input, and

a welding-type output;

a feedback circuit, responsive to the welding-type output, and having a feedback output;

a controller having

a feedback input connected to the feedback output,

a voltage control loop responsive to the feedback input,

a temporal control loop responsive to the feedback input,

a control output, responsive to that voltage control loop and the temporal control loop, connected to the control input.

17. A system for welding, comprising:

power means for supplying welding-type power in response to at least one control input;

feedback means for feeding back at least one output parameter of the welding-type power, connected to the power means;

control means for controlling the power means in response to the a feedback means, connected to the feedback means and the power means, wherein the control means includes a voltage control loop and a temporal control loop.

18. A method of providing welding power, comprising:

providing a welding-type power output;

feeding back a parameter of the power output;

controlling the welding-type power in response to the feeding back, using a voltage control loop and a temporal control loop.

19. A welding-type power supply controller comprising:

at least one feedback input;

a voltage control loop, including

a voltage feedback input connected to the feedback input, and

an integrator having first and second feedback capacitors, wherein

a switch, having a switch control input, is in series with the second capacitor; and

an eta controller having an input connected to the feedback input, and an output connected to the switch control input.

20. A method of controlling welding-type power comprising:

providing voltage feedback;

integrating the difference between a voltage feedback and a threshold using an integrator with first and second capacitors in a feedback path;

comparing eta to a window;

switching the second feedback capacitor in and out of the feedback path in response to comparing eta.

21. A system for welding, comprising:

a welding power source having at least one power source control input and a welding power output;

a wire feeder connected to the welding power output and having a wire feed speed input;

a feedback circuit, responsive to the welding power output, and having a feedback output; and

a controller, having

a feedback input connected to the feedback output,

a fast-tack detect circuit responsive to a trigger signal,

a speed control output responsive to the fast-tack detect circuit, and in electrical communication with the wire feed speed input, and

a power source control output responsive to the fast-tack detect circuit, and in electrical communication with power source control input.

22. The system of claim 21 further comprising:

a fast-tack control circuit disposed electrically between the fast-tack detect circuit and the power source control output, and disposed electrically between the fast-tack detect circuit and the wire-feed speed output; and

a weld control circuit disposed electrically between the fast-tack detect circuit and the power source control output and disposed electrically between the fast-tack detect circuit and the wire-feed speed output.

23. The system of claim 21, wherein the power source control output includes a voltage command, including at least one of an open circuit command and a burn back command, and the wire feed speed output includes a ramp to run-in command.

24. The system of claim 23, wherein the fast-tack detect circuit includes a timer circuit responsive to a trigger signal.

25. The system of claim 21, further comprising:

an inductor winding in electrical communication with the welding power output,

an auxiliary winding in magnetic and electrical communication with the inductor winding; and

a switch circuit in series with the auxiliary winding;

wherein the switch circuit is responsive to the fast-tack detect circuit.

26. A method of welding, comprising:

supplying welding power to an arc;

feeding wire to the arc;

feeding back a signal responsive to the welding power;

detecting whether or not the process is a fast-tack process;

controlling the supply of power according to a first control scheme if the process is a fast-tack process; and

controlling the supply of power according to a second control scheme if the process is not a fast-tack process.

27. The method of claim 26 further comprising controlling an open circuit voltage, a burn back voltage, and a ramp to run-in wire feed speed to a first level in the first control scheme and to a different level in the second control scheme.

28. The method of claim 27, wherein detecting includes detecting the time between at least two trigger pulls.

29. A system for performing a welding process, comprising:

power means for providing welding power to an arc;

feeder means for feeding wire to the arc;

feedback means for feeding back a feedback output in response to the welding power provided;

detect means for detecting whether or not the process is a fast-tack process, connected to a trigger input;

speed control means for controlling a speed of the feeder means in response to the detect means, in electrical communication with the feeder means; and

power control means for controlling the power means in response to the detect means, in electrical communication with power means.

30. The system of claim 29, wherein:

the power control means includes means for controlling at least one of an open circuit command and a burn back command; and

the speed control means includes means for controlling a ramp to run-in speed command.

31. The system of claim 30, wherein the detect means includes means for determining the time between at least two trigger signals.

32. The system of claim 29, further comprising means for reducing an output inductance when the arc is initiating.

33. A system for welding, comprising:

means for supplying welding power to an arc;

means for feeding wire to the arc;

means for feeding back a signal responsive to the welding power, in electrical communication with the means for supplying;

means for detecting whether or not the process is a fast-tack process, responsive and connected to a trigger signal;

means for controlling the means for supplying according to a first control scheme is the process is a fast-tack process, connected to the means for

supplying, and responsive to the means for detecting; and

means for controlling the means for supplying according to a second control scheme if the process is not a fast-tack process, connected to the means for supplying, and responsive to the means for detecting.

34. The system of claim 33 further comprising means for controlling an open circuit voltage, a burn back voltage, and a ramp to run-in wire feed speed to a first level in the first control scheme and a different level in the second control scheme.

35. The system of claim 34, wherein the means for detecting includes means for detecting the time between at least two trigger pulls.

36. A system for welding, comprising:

a welding power source having at least one power source control input and a welding power output;

a wire feeder connected to the welding output and having a wire feed speed input;

a feedback circuit, responsive to the welding power output and a trigger signal, and having a feedback output; and

a controller, responsive to the feedback output, and having

a first control output connected to the power source control input and connected to the wire feed speed input, and

a second control output connected to the power source control input and connected to the wire feed speed input.

37. The system of claim 36, wherein the first control output is a fast-tack control output and the second control output is a welding control output.

38. A system for welding comprising:

a welding power source having a welding power output;

a wire feeder connected to the welding output and having a speed control input; and

a controller having a speed control output connected to the speed control input having a weld wire speed set point, and a run-in wire speed set point, wherein the run-in speed set point is a set percentage of the weld wire speed set point.

39. The system of claim 38, wherein the set percentage is a user selectable percentage.

40. The system of claim 39, wherein the percentage is between 25 percent and 150 percent.

41. The system of claim 39, wherein the system includes a weld wire feed user input, and wherein the controller includes a run-in set circuit including a percent input connected to the user input and an enable input.

42. The system of claim 41, wherein the enable input receives a trigger state signal and a power-up signal.

43. The system of claim 42 wherein the user input is a potentiometer.

44. The system of claim 43, wherein the enable input in connected to a user selectable toggle switch.

45. The system of claim 38 wherein the controller is a microprocessor controller.

46. The system of claim 38 wherein the controller is an analog controller.

47. A system for welding comprising:

power means for supplying welding power to an arc;

feeder means for feeding wire to the arc; and

control means for controlling a speed of the feeder means to a weld speed and a run-in speed, wherein the run-in speed set point is a set percentage of the weld speed set point, connected to the feeder means.

48. The system of claim 47, further comprising means for allowing the user to select the set percentage, connected to the control means.

49. A method of welding comprising:

providing welding power to an arc;

feeding wire to the arc;

controlling the speed of the wire during a run-in state; and

controlling the speed of the wire during a weld state, wherein the run-in speed set is a set percentage of the weld speed.

50. The method of claim 49, including using a user selectable percentage as the set percentage.

51. The method of claim 50, including using the set percentage from the range of between 25 percent and 150 percent.

52. The method of claim 51, including determining the user selected percentage speed in response to an enable signal and a weld wire feed user input.

53. A welding-type power supply, comprising:

a power source;

a controller, connected to the power source, and having at least one set point input, and at least one calibration input;

a user-selectable input connected to the at least one set point input, and further connected to the at least one calibration input.

54. The welding-type power supply of claim 53, further comprising an input-selection circuit, connected to the controller, wherein the controller enables one of the calibration input and set point input, and disables the other of the set point input and calibration input.

55. The welding-type power supply of claim 54, further comprising a user-selectable switch connected to the input-selection circuit.

56. The welding-type power supply of claim 55, wherein the user selectable switch is a toggle switch.

57. The welding-type power supply of claim 56, wherein the user-selectable input is a potentiometer on a user control panel.

58. The welding-type power supply of claim 54, wherein the controller is a microprocessor controller.

59. The welding-type power supply of claim 58, wherein the microprocessor controller includes storage of at least one user-selected calibration value received on the calibration input.

60. The welding-type power supply of claim 59, wherein the microprocessor controller includes storage of at least two user-selected calibration values received on the calibration input, and wherein the microprocessor includes a scaling circuit that scales at least one of a command output or a feedback output responsive to the at least two user-selected calibration values.

61. The welding-type power supply of claim 60, wherein the microprocessor controller includes a digital output disposed to output the at least two user-selected calibration values.

62. The welding-type power supply of claim 55, further comprising a calibration pendant, on which the toggle switch is mounted.

63. The welding-type power supply of claim 53, wherein the calibration input is an output voltage calibration input.

64. The welding-type power supply of claim 53, further comprising:

a wire feeder connected to the controller; and

a second user selectable input; wherein

the controller includes a wire feed speed calibration input and a wire feed speed set point input, both connected to the second user-selectable input.

65. A welding-type power supply, comprising:

power means for providing power;

input means for receiving user-selectable input; and

control means, connected to the input means and the power means, for controlling the power means, and for selectively choosing one of a set point and a calibration value as a value received from the input means.

66. The welding-type power supply of claim 65, further comprising means for the user to selectively choosing one of the set point and the calibration value as the value received from the input means.

67. The welding-type power supply of claim 65, including means for storing at least one user-selected calibration value received on the calibration input.

68. A method of calibrating a welding-type power supply, of the type having a user-selectable set point input, comprising:

detecting whether or not the power supply is in a calibration mode;

receiving a value from the user-selectable set point input as a calibration value if the power supply is in the calibration mode; and

receiving a value from the user-selectable set point input as a set point value if the power supply is not in the calibration mode.

69. The method of claim 68, further comprising receiving a user-selection indicating if the power supply is in the calibration mode.

70. The method of claim 68, further comprising storing the calibration value.